Chapter 3

FORECASTS OF AVIATION ACTIVITY

Introduction

This chapter examines the forecasts of aviation-related activity from two aviation system plans and assesses the need to prepare new forecasts for use in this study. The forecasts include registered pilots, registered aircraft and aircraft operations. As part of this evaluation process, those factors that served as input to and influenced the development of the earlier aviation projections were reviewed. These include statewide socioeconomic characteristics, and local and national trends in the aviation industry. The forecasts of annual activity were then used to derive projections of peak-hour aircraft operations under instrument flight rule (IFR) procedures to assess demand versus capacity relationships.

Socioeconomic Characteristics

The forecasts of aviation activity presented in the 1995 State Aviation Needs Study (SANS) and 1996 Maricopa Association of Governments Regional Aviation System Plan were reviewed for their continued validity. These forecasts address registered pilots, based aircraft and general aviation activity. The projections were predicated on population, employment and per capita income measures as well as anticipated trends in the aviation industry. Significant changes in the values of these independent socioeconomic variables and/or industry trends could result in a requirement for new projections.

A review of the socioeconomic data as forecast for 1995 and compared to actual results led to the following conclusions:

1. The actual population of Arizona in 1995 was 4,307,150 as compared to the value of 4,134,925 used in the earlier aviation plans. The population distribution among the 15 counties varied as well with some higher and lower than that projected. Counties in the northeast portion of the State actually experienced lower populations than those in the southwest, northwest and Valley (Maricopa County) regions when compared to the levels used in the earlier studies.

2. Rates of growth in population as presented in current State population projections compared to those used previously indicate generally comparable levels in most counties. Differences in growth rates occur in the southeastern counties where growth rates are greater than earlier projected. However, in terms of the number of persons, the differences are slight. The Valley region had a higher population in 1995 than that projected earlier, a difference of five percent. The higher growth rate now anticipated for the Valley increases this difference by the year 2020 to about nine percent. The Valley accounted for about 59 percent of the State population in 1995; by 2020, this share will increase slightly to some 61 percent. These percentage shares are essentially the same as those used as input to the previous aviation system planning studies.

3. Employment levels in Arizona have been expanding at growth rates above that of the nation and this trend is expected to continue in the future as represented by the Arizona Department of Economic Security. This scenario was similarly anticipated when the earlier projections of aviation activity were prepared.

4. Historical and forecast per capita income levels used in the previous studies were presented in current 1994 values, but the basis for the adjustment was not articulated. This results in an inability to directly compare actual versus historical values, and projections then considered and those now available. Nonetheless, current per capita income projections indicate a continued increasing trend in dollar amounts, but at values about 12 percent less than those anticipated for the United States.

In sum, the variances in the socioeconomic factors between the time the 1995 SANS and regional aviation system plan were developed and the present are not significant to warrant a revision to the earlier forecasts presented. However, as described below, there may be other factors that may indicate a need to present new projections.

Registered Pilots

The 1995 SANS projections of registered pilots in Arizona for 1995 were nearly 20 percent less than the actual count as provided in FAA records –13,072 versus 15,662. Within the groupings of general aviation, commercial and airline transport pilots, some 60 percent of the difference can be attributed to the latter sector. A revised projection of registered pilots by county was developed to account for this variance using the most current FAA data available (end of calendar year 1997). The analysis considered historical trends in aviation activity in Arizona and nationally, and an assessment of future potential directions.

Since 1990, all categories of registered pilots in Arizona have shown increases in counts versus declines nationwide with the exception of the national number of airline transport pilots which also grew in size. The 1995 SANS and FAA projections during this period continued their respective trends. More recently, the potential for growth in the general aviation sector has improved due to industry promotions and the slightly delayed effect of product liability reform legislation in 1994. This is reflected in the fiscal year 1998 FAA projections that indicate growth in each of the pilot groupings through their forecast horizon to fiscal year 2009. These projections show growth rates ranging from 0.6 percent to 2.7 percent annually on average, with the higher growth applied to the general aviation pilot category.

Historical growth patterns in Arizona aviation activity have been more positive than those nationwide. The is due in large part to increasing general population levels and the climate that is conducive to flight activity, particularly in the southern half of the State. It was determined that each of the three pilot sectors would continue to show gains in numbers. Average annual growth rates of 2.5 percent, 1.5 percent and 1.5 percent were applied to the general aviation, commercial and airline transport groupings, respectively. These projections indicate that the general aviation pilot sector will remain as the largest in terms of number of pilots and account for a slightly increasing percentage of the total registered pilot population over time, from 56 percent in 1997 to 61 percent by the year 2015. The resulting forecasts are shown in Tables 3-1 through 3-4.

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Table 3-1

REGISTERED GENERAL AVIATION PILOTS

	Actual	Forecast			
County	1997	2000	2005	2010	2015
Apache	23	25	28	32	36
Cochise	284	306	346	391	443
Coconino	251	270	306	346	391
Gila	70	75	85	96	109
Graham	22	24	27	30	34
Greenlee	9	10	11	12	14
La Paz	38	41	46	52	59
Maricopa	5,888	6,341	7,174	8,117	9,183
Mohave	334	360	407	460	521
Navajo	76	82	93	105	119
Pima	1,498	1,613	1,825	2,065	2,336
Pinal	155	167	189	214	242
Santa Cruz	40	43	49	55	62
Yavapai	576	620	702	794	898
Yuma	153	165	186	211	239
Unknown	9	10	11	12	14
Total	9,426	10,512	11,485	12,292	14,700

Sources: U.S. Civil Airmen Statistics, FAA, December 31, 1997.
QED for forecast years.

Table 3-2

REGISTERED COMMERCIAL PILOTS

County	Actual 1997	Forecast 2000	2005	2010	2015
Apache	6	6	7	7	8
Cochise	96	100	108	117	126
Coconino	108	113	122	131	141
Gila	27	28	30	33	35
Graham	11	12	12	13	14
Greenlee	5	5	6	6	7
La Paz	16	17	18	19	21
Maricopa	1,891	1,977	2,130	2,295	2,472
Mohave	93	97	105	113	122
Navajo	29	30	33	35	38
Pima	584	611	658	709	763
Pinal	64	67	72	78	84
Santa Cruz	13	14	15	16	17
Yavapai	271	283	305	329	354
Yuma	96	100	108	117	126
Unknown	1	1	1	1	1
Total	3,311	3,461	3,730	4,019	4,329

Sources: U.S. Civil Airmen Statistics, FAA, December 31, 1997.
QED for forecast years.

Table 3-3

REGISTERED AIRLINE TRANSPORT PILOTS

County	Actual 1997	Forecast 2000	2005	2010	2015
Apache	5	5	6	6	7
Cochise	49	51	55	59	64
Coconino	76	79	86	92	99
Gila	18	19	20	22	24
Graham	-	0	0	0	0
Greenlee	-	0	0	0	0
La Paz	4	4	5	5	5
Maricopa	2,931	3,065	3,302	3,557	3,832
Mohave	48	50	54	58	63
Navajo	17	18	19	21	22
Pima	554	579	624	672	724
Pinal	32	33	36	39	42
Santa Cruz	9	9	10	11	12
Yavapai	176	184	198	214	230
Yuma	70	73	79	85	92
Unknown	3	3	3	4	4
Total	3,992	4,172	4,497	4,845	5,220

Sources: U.S. Civil Airmen Statistics, FAA, December 31, 1997.
QED for forecast years.

Table 3-4

TOTAL REGISTERED PILOTS

	Actual	Forecast			
County	1997	2000	2005	2010	2015
Apache	34	36	41	45	51
Cochise	429	457	509	567	633
Coconino	435	462	514	569	631
Gila	115	122	135	151	168
Graham	33	36	39	43	48
Greenlee	14	15	17	18	39
La Paz	58	62	69	76	85
Maricopa	10,710	11,383	12,606	13,969	15,487
Mohave	475	507	566	631	706
Navajo	122	130	145	161	179
Pima	2,636	2,803	3,107	3,446	3,823
Pinal	251	267	297	331	368
Santa Cruz	62	66	74	82	91
Yavapai	1,023	1,087	1,205	1,337	1,482
Yuma	319	338	373	413	232
Unknown	13	14	15	17	19
Total	16,729	17,785	19,712	21,856	24,042

Sources: U.S. Civil Airmen Statistics, FAA, December 31, 1997
QED for forecast years.

Registered Aircraft

The 1995 SANS projected a 1995 estimate of 6,105 registered aircraft in Arizona. Records available from the ADOT Aeronautics indicate that the actual count was 5,076. The difference is due in large part to a change in aircraft registration regulations and fees in Arizona, which served to distinguish between airworthy aircraft and those no longer in use. The latter aircraft are not included in the 5,076 count.

Although most pilots indicated a base location for their aircraft when registering, thus enabling a listing of aircraft by county, some were without such designation. These aircraft, representing about five percent of the total, were proportionately allocated to each county. Future levels of Arizona active registered aircraft were determined based on average annual growth rates and percentage allocations utilized in preparing the 1995 SANS. The resulting projections are presented in Table 3-5.

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Table 3-5

TOTAL REGISTERED AIRCRAFT

County	Actual 1995	Forecast 2000	2005	2010	2015
Apache	27	30	32	35	38
Cochise	128	138	148	158	167
Coconino	149	165	181	196	210
Gila	54	57	59	62	64
Graham	35	39	43	45	47
Greenlee	2	2	2	2	2
La Paz	43	44	47	51	54
Maricopa	2,796	2,951	3,165	3,398	3,650
Mohave	208	238	269	301	331
Navajo	82	88	94	100	107
Pima	748	893	1,021	1,078	1,171
Pinal	245	266	287	307	326
Santa Cruz	17	19	21	23	25
Yavapai	398	451	511	574	636
Yuma	144	161	177	193	210
Total	5,076	5,542	6,057	6,523	7,038

Source: 1995 State Aviation Needs Study.

General Aviation Activity

In the early and mid-1990's, growth in general aviation activity was viewed with guarded optimism. This was due primarily to the cost of flying which increased more rapidly than the cost of living, and to issues related to tort liability for aircraft manufacturers. The forecasts presented in the 1995 SANS indicate a slightly increasing growth rate, about 1.8 percent annually statewide over a 20-year period. Relatively higher growth rates were projected for the northwestern counties (2.8 percent) with those in the southeastern counties reflecting an average annual growth rate of 1.1 percent. The Valley region was expected to realize growth at a rate of 1.7 percent annually on average. Comparatively, the average annual growth rate projected in 1995 by the FAA for general aviation activity in the country was some 0.9 percent for an 11-year period. Current national projections of general aviation activity by the FAA indicate an average annual growth rate of 0.7 percent. Although these projections reflect a more positive outlook for general aviation than in years past, they place a higher emphasis on business corporate flight activity and the use of more sophisticated multi-engine aircraft including jets.

The process by which the 1995 SANS forecasts of general aviation activity were derived reflects an industry-accepted methodology employing the use of regression analysis. The measures of population, employment and income used continue to be valid with comparable growth rates and characteristics Statewide and by county and region. Aircraft operations growth rate levels used in the earlier projections were higher than those applied to generate nationwide forecasts both in 1995 and those currently in use, thus reflecting the higher propensity to fly in good weather climates. Overall, it appears that the projections shown in the 1995 SANS and 1996 regional aviation study remain valid for continued application. These forecasts are presented in Table 3-6.

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Table 3-6

GENERAL AVIATION AIRCRAFT OPERATIONS

County	Airport	Actual 1995	Forecast 2000	2005	2010	2015
Apache	Chinle	2,703	2,703	2,703	8,109	8,109
	Ganado	108	108	108	108	108
	Greasewood (Closed)	108	108	108	108	108
	Lukachukai	108	108	108	108	108
	Pine Springs	65	65	65	65	65
	Rock Point	324	324	324	324	324
	Springerville Babbit Field	6,486	7,027	7,567	7,567	8,108
	St. Johns Industrial Park	4,108	4,108	4,108	4,519	4,930
	Toyei School (Closed)	22	22	22	22	22
	Window Rock	5,045	7,567	7,567	7,567	10,089
Cochise	Benson Municipal (New)	-	800	1,200	1,600	1,800
	Bisbee Douglas International	1,946	1,946	2,141	2,335	2,530
	Bisbee Municipal	7,610	8,245	8,879	9,513	10,147
	Bowie	600	800	800	1,000	1,000
	Cochise College	59,455	59,455	59,455	59,455	59,455
	Cochise County	7,243	7,800	8,357	8,636	8,914
	Douglas Municipal	7,459	7,459	7,832	7,832	8,205
	Libby AAF / Sierra Vista	21,131	23,112	23,773	27,075	29,056
	Tombstone Municipal	216	216	216	216	216

Table 3-6

GENERAL AVIATION AIRCRAFT OPERATIONS

County	Airport	Actual 1995	Forecast 2000	2005	2010	2015
Coconino	Cliff Dwellers Lodge	200	200	200	200	200
	Flagstaff-Pulliam	48,020	52,946	59,102	64,643	69,568
	Grand Canyon National Park	2,162	2,378	2,594	2,702	3,027
	H.A. Clark Memorial	216	216	216	216	216
	Marble Canyon	2,270	2,838	3,405	3,405	3,405
	Page Municipal	14,127	15,742	17,358	18,971	20,585
	Tuba City	6,486	6,486	6,486	6,486	6,486
Gila	Globe-San Carlos Regional	5,264	5,528	5,791	5,791	6,054
	Payson	21,776	22,723	23,670	25,563	26,510
	Pleasant Valley International	200	200	200	200	200
	San Carlos	2,000	2,500	3,000	4,000	5,000
Graham	Safford Regional	16,564	17,632	19,235	20,304	21,907
Greenlee	Duncan-O'Connor Field (Closed)	-	1,300	1,700	2,000	2,500
	Greenlee County	3,784	3,784	3,784	3,784	3,784
La Paz	Avi Suquilla	25,404	25,404	26,381	27,358	28,335
	Quartzsite (New)	-	1,000	1,400	2,000	2,400

Table 3-6

GENERAL AVIATION AIRCRAFT OPERATIONS

County	Airport	Actual	Forecast			
		1995	2000	2005	2010	2015
Maricopa	Buckeye Municipal	47,000	62,500	81,800	107,200	140,600
	Chandler Municipal	189,000	200,600	212,900	226,000	242,000
	Gila Bend Municipal	12,800	13,600	14,500	15,400	16,300
	Glendale Municipal	167,500	185,800	206,200	228,700	253,300
	Memorial Airfield[1]	2,300	4,100	7,600	13,800	25,100
	Mesa-Falcon Field	202,300	213,700	255,700	238,300	252,200
	Phoenix-Deer Valley	296,400	316,100	337,200	359,700	386,100
	Phoenix- Goodyear	222,000	242,700	265,400	290,100	313,700
	Phoenix Sky Harbor Int'l	92,066	85,358	78,500	73,000	68,000
	Scottsdale	271,300	278,200	285,200	292,400	300,000
	Stellar Airpark	52,200	53,800	55,400	57,100	58,100
	Wickenburg Municipal	17,800	19,400	21,100	23,000	25,000
	Williams Gateway	37,600	75,800	95,300	128,500	159,500
Mohave	Colorado City	865	865	1,298	1,298	1,514
	Grand Canyon Bar-Ten	200	200	200	200	200
	Grand Canyon Caverns	200	200	200	200	200
	Grand Canyon West	200	200	200	200	400
	Hualapai Tribal	200	200	400	1,000	2,000
	Kingman	28,961	31,374	33,184	34,391	35,598
	Lake Havasu City Municipal	34,364	39,651	43,805	48,336	51,735
	Laughlin / Bullhead City	93,370	118,420	138,916	163,967	179,908
	Pearce Ferry	200	200	200	200	400
	Sun Valley	200	200	200	200	200
	Temple Bar	3,026	3,026	3,026	3,026	4,539
	Tuweep	200	200	200	200	200

Note: 1. Airport was closed to aircraft in 1997 and forecast operations may not reach these levels. Airport continues to be used for practice approaches.

Table 3-6

GENERAL AVIATION AIRCRAFT OPERATIONS

County	Airport	Actual	Forecast			
		1995	2000	2005	2010	2015
Navajo	Holbrook Municipal	973	1,022	1,070	1,070	1,119
	Kayenta	4,000	4,000	4,000	4,000	4,000
	Low Mountain (Closed)	200	200	200	200	200
	Pinon	200	200	200	200	200
	Polacca	200	200	200	200	200
	Rocky Ridge	200	200	200	200	200
	Shonto	200	200	200	200	200
	Show Low Municipal	13,837	15,374	16,912	19,218	20,756
	Taylor Municipal	3,784	4,099	4,730	5,045	5,045
	Whiteriver	1,730	1,730	1,730	1,730	1,730
	Winslow Municipal	20,539	20,539	20,539	22,119	22,119
Pima	Ajo Municipal	1,600	1,800	2,000	2,200	2,400
	Avra Valley	30,200	34,200	36,800	39,200	41,800
	Flying J Ranch	200	200	200	200	200
	Ryan Airfield	41,000	46,200	49,800	53,200	56,800
	Sells	200	200	200	200	400
	Tucson International	71,000	80,200	86,400	92,200	98,400

Table 3-6

GENERAL AVIATION AIRCRAFT OPERATIONS

County	Airport	Actual 1995	Forecast 2000	2005	2010	2015
Pinal	Ak Chin Community	400	400	600	600	800
	Casa Grande Municipal	86,974	92,904	100,811	106,741	108,718
	Coolidge Municipal	8,513	9,459	10,405	11,351	12,296
	Eloy Municipal	24,623	26,424	28,226	30,028	31,229
	Estrella Sailport	72,968	78,373	83,778	88,282	92,786
	Kearny	5,318	5,318	7,091	8,864	10,637
	Pinal Airpark	8,980	9,653	10,214	10,888	11,449
	San Manuel	1,390	1,544	1,699	1,853	2,008
	Superior	216	648	648	864	1,080
Santa Cruz	Nogales International	3,695	4,223	4,751	5,279	5,807
Yavapai	Bagdad	18,626	23,283	29,104	37,253	44,238
	Cordes lake (New)	-	2,000	3,000	4,700	6,000
	Cottonwood Municipal	18,354	20,489	23,903	27,318	30,306
	Ernest A. Love Field	293,082	330,903	370,142	411,831	450,993
	Sedona	16,677	18,786	21,278	23,578	26,262
	Seligman	200	400	600	800	1,000
Yuma	Rolle Field	200	200	200	200	200
	Yuma International	89,862	99,540	109,908	119,586	129,263

Sources: 1995 State Aviation Needs Study.
1996 Maricopa Association of Governments Regional Aviation System Plan.

IFR Peak-Hour Aircraft Operations

Forecasts of IFR peak-hour aircraft operations were generated from the projections of total activity as presented in Table 3-6. The forecast process derives estimates of instrument operations based on a methodology developed for the FAA in the report, "An Improved Forecast Model for Annual Instrument Approaches". The translation of annual aircraft operations into annual instrument operations takes into consideration the extent of itinerant aircraft activity at the airport as identified in airport- or aviation-specific studies and the use of IFR flight plans. The latter was anticipated to increase over time as more pilots become IFR-rated. Adjustments to the data presented in Table 3-6 were made to account for airports with scheduled aircraft service.

IFR peak-hour aircraft operations were based on a planning factor that activity during the peak-hour is 3 times the average hourly activity measured during a 16-hour day. This factor was based on the experience and judgement of QED. The resultant values, as presented in Table 3-7, were determined to be reasonable and appropriate for use in this study. In many cases, a nominal value of one IFR peak-hour aircraft operation was assigned. This accounts for those airports, with or without an instrument approach procedure, that can serve as a point of departure for access to the IFR operating environment.

IFR Peak-Hour Capacity

IFR peak-hour capacities for each system airport are also presented in Table 3-7 for convenience of comparison. The capacities reflect existing airport situations whereas the forecasts shown are for the year 2015, reflecting a conservative view. The capacities were based on the extent and type of instrument approaches at each airport, the availability of an approach

Table 3-7

IFR PEAK-HOUR DEMAND / CAPACITY

County	Airport	IFR Peak-Hour Demand	IFR Peak-Hour Capacity
Apache	Chinle	1	3
	Ganado	1	3
	Greasewood (Closed)	1	3
	Lukachukai	1	3
	Pine Springs	1	3
	Rock Point	1	3
	Springerville Babbit Field	1	10
	St. Johns Industrial Park	1	5
	Toyei School (Closed)	1	3
	Window Rock	1	10
Cochise	Benson Municipal (New)	1	5
	Bisbee Douglas International	1	10
	Bisbee Municipal	1	3
	Bowie	1	3
	Cochise College	3	3
	Cochise County	1	10
	Douglas Municipal	1	3
	Libby AAF / Sierra Vista	1	30
	Tombstone Municipal	1	3
Coconino	Cliff Dwellers Lodge	1	3
	Flagstaff-Pulliam	10	25
	Grand Canyon National Park	1	25
	H.A. Clark Memorial	1	3
	Marble Canyon	1	3
	Page Municipal	2	10
	Tuba City	1	3
Gila	Globe-San Carlos Regional	1	3
	Payson	1	3
	Pleasant Valley International	1	3
	San Carlos	1	3
Graham	Safford Regional	1	3
Greenlee	Duncan-O'Connor Field (Closed)	1	3
	Greenlee County	1	3

Table 3-7

IFR PEAK-HOUR DEMAND / CAPACITY

County	Airport	IFR Peak-Hour Demand	IFR Peak-Hour Capacity
La Paz	Avi Suquilla	2	5
	Quartzsite (New)	1	10
Maricopa	Buckeye Municipal	8	3
	Chandler Municipal	10	10
	Gila Bend Municipal	1	3
	Glendale Municipal	9	3
	Memorial Airfield	2	3
	Mesa-Falcon Field	10	15
	Phoenix-Deer Valley	14	15
	Phoenix- Goodyear	14	3
	Phoenix Sky Harbor Int'l	72	90
	Scottsdale	17	20
	Stellar Airpark	3	3
	Wickenburg Municipal	1	3
	Williams Gateway	9	40

County	Airport	IFR Peak-Hour Demand	IFR Peak-Hour Capacity
Mohave	Colorado City	1	5
	Grand Canyon Bar-Ten	1	3
	Grand Canyon Caverns	1	3
	Grand Canyon West	1	3
	Hualapai Tribal	1	10
	Kingman	2	10
	Lake Havasu City Municipal	3	15
	Laughlin / Bullhead City	13	10
	Pearce Ferry	1	3
	Sun Valley	1	3
	Temple Bar	1	3
	Tuweep	1	3
Navajo	Holbrook Municipal	1	3
	Kayenta	1	3
	Low Mountain (Closed)	1	3
	Pinon	1	3
	Polacca	1	3
	Rocky Ridge	1	3
	Shonto	1	3
	Show Low Municipal	1	3
	Taylor Municipal	1	3
	Whiteriver	1	3
	Winslow Municipal	1	10

Table 3-7
IFR PEAK-HOUR DEMAND / CAPACITY

County	Airport	IFR Peak-Hour Demand	IFR Peak-Hour Capacity
Pima	Ajo Municipal	1	3
	Avra Valley	2	3
	Flying J Ranch	1	3
	Ryan Airfield	2	20
	Sells	1	3
	Tucson International	18	50
Pinal	Ak Chin Community	1	3
	Casa Grande Municipal	2	20
	Coolidge Municipal	1	10
	Eloy Municipal	2	3
	Estrella Sailport	1	1
	Kearny	1	1
	Pinal Airpark	1	3
	San Manuel	1	3
	Superior Municipal	1	1
Santa Cruz	Nogales International	1	5
Yavapai	Bagdad	3	3
	Cordes Lake (New)	1	10
	Cottonwood Municipal	1	3
	Ernest A. Love Field	12	50
	Sedona	2	5
	Seligman	1	3
Yuma	Rolle Field	1	3
	Yuma International	8	50

Source: QED.